When it comes to the more complex A-B-O groups, Lahovary's difficulties with his index are multiplied, and his diagrams become more complex and confused. He objects to the use of gene frequency analysis, evidently because this is too esoteric, and argues that his index calculated from phenotype frequencies is simpler. But for some obscure reason, he presents tables showing A-B-O gene frequencies on pages 175 to 179. Moreover, in a footnote to page 35, he derives novel but incorrect formulae for calculating the A-B-O gene frequencies. The subgroups of A are mentioned merely in passing, which is fortunate, because any attempt to include them when calculating the index would only befuddle the picture further. As to be expected, the treatment of the more complex Rh-Hr types is totally jumbled, and in the tables on pages 226 to 230, genes, genotypes and phenotypes are confused beyond repair. Nowhere in the monograph does Lahovary make any attempt to apply statistical analysis to determine the significance of the differences among the indices calculated by his method.

In view of the considerations which have been presented, Lahovary's book cannot be recommended.

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Adaptation in Micro-organisms

Third Symposium of The Society for General Microbiology, London, 1953. Edited by R. Davies and E. F. Gale. New York: Cambridge University Press, 1953, pp. 339, illus. and plates, $6.

THIS volume contains the papers and discussions of the third symposium of The Society for General Microbiology, held at the Royal Institution, London, in April 1953. An interesting feature of the conference was that the papers of the fifteen invited participants were printed and circulated in gally proof to all members of the Society some two weeks before the conference; at the meeting the papers were taken as read, and the time was devoted to discussion, questions, and argument. Consequently, many of the printed discussions contain well considered material and make significant contributions to the problems in question.

In an introductory paper Stanier gives a concise outline of key points connected with the adaptation of microorganisms. In the next paper, consisting of observations on bacterial adaptation by Dean and Hinshelwood, some concession is made to the view that genetic mutations may be responsible for adaptation in microorganisms, but the main emphasis is placed on adaptation through some ill defined process of "training." A paper discussing drug resistance, given at a later session by Abraham, is strongly biased toward Hinshelwood's view; and two other papers on the same topic by Barber and by Mitchison avoid controversial issues. Pontecorvo, who did not present a formal paper, represents the geneticist's point of view strongly in the discussions. In particular, he stresses the importance of heterokaryosis and of mitotic recombination as possible mechanisms of adaptation in fungi.

Evidence that both genic and cytoplasmic components of a cell are involved in certain adaptations is presented by Slonimskik who describes work on the action of acridines in enzymic adaptation in yeasts, and by Beale, who discusses four kinds of adaptive change in *Paramecium* that can occur as a consequence of cytoplasmic reorganization—without gene mutation, but in which, nevertheless, genes play an important part. Pollock, in discussing a cyclic system of adaptive enzyme formation to explain the kinetics of penicillinase synthesis, also presents his speculative hypothesis on the role of enzyme adaptation in genetics. Other papers relating to enzymic adaptation deal with: the effect of various substrates on adaptation in the citric acid cycle in *Aerobacter aerogenes* (Ravin); the nature of the precursor in the induced synthesis of enzymes (Spiegelman and Halvorson); specific control of the synthesis of adaptive and constitutive enzymes (Cohn and Monod); and the effect of temperature on enzymic adaptation, growth, and drug resistance (Knox).

The remaining three papers discuss the influence of bacteriophage on bacterial variation and evolution (Hewitt), adaptation in thermophiles (Clegg and Jacobs), and ecological adaptations in fungi (Brown and Wood). This volume contains many good ideas, and makes very interesting reading.

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